

Patent Claims

- 5 1. A method for battery state identification for a motor vehicle, having the following steps:
(S1) measurement of a voltage of a motor vehicle battery (5) during the starting process of a motor vehicle over a predetermined time period,
10 (S2) determination of a minimum voltage level of the motor vehicle battery (5) during the predetermined time period of the measurement process,
(S3-1 to S3-3; S3-0 to S3-3*) assessment of a state of charge of the motor vehicle battery (5) on the basis of
15 the determined minimum voltage level,
(S4-1 to S4-3) control of a generator as a function of the assessment of the state of charge of the motor vehicle battery (5), so as to ensure an adequate supply for the vehicle power supply system and adequate
20 charging of the motor vehicle battery (5), while at the same time optimizing the fuel consumption and the emissions.
2. The method as claimed in claim 1,
25 characterized
in that
(S5) the result of the assessment is output to a vehicle user.
- 30 3. The method as claimed in claim 1 or 2, characterized
in that
the assessment of the state of charge in steps S3-1 to S3-3 is carried out by association of the minimum
35 voltage level with one of at least two predetermined state of charge ranges.
4. The method as claimed in claim 3,
characterized
40 in that

three predetermined state of charge ranges (BZ1, BZ2, BZ3) are formed, and are defined by two threshold values (V1, V2).

5 5. The method as claimed in claim 3,
characterized
in that
the three predetermined state of charge ranges are the
"very powerful" (BZ1), "powerful" (BZ2) and "restricted
10 power" (BZ3) states of charge.

6. The method as claimed in one of claims 2 to 5,
characterized
in that
15 the result of the assessment in step S5 is output
visually.

7. The method as claimed in claim 5,
characterized
20 in that
the result of the assessment in step S5 is produced
visually in the form of different colors for the three
states of charge "restricted power" (BZ3), "powerful"
(BZ2) and "very powerful" (BZ1).

25
8. The method as claimed in one of claims 1 to 7,
characterized
in that,
in step S4-3, a nominal value of the charging voltage
30 is predetermined for a normal charging level for an
unlimited time for the generator (4) for a state of
charge is "restricted power" (BZ3),
in step S4-2, a nominal value of the charge voltage for
engine load reduction, followed by the nominal value of
35 the charging voltage for the normal charging level are
predetermined for a predetermined time period for the
generator (4) for a "powerful" (BZ2) state of charge,
in step S4-1, the nominal value of the charging voltage
is predetermined for the value for engine load
40 reduction, followed by a reduced vehicle power supply

system level and then a recuperation level over a predetermined time period for the generator (4) for a "very powerful" (BZ1) state of charge.

5 9. The method as claimed in one of claims 1 to 7,
characterized
in that,
in steps S4-1 to S4-3, the generator is controlled as a
function of the assessment of the state of charge of
10 the motor vehicle battery (5) and of at least one
further parameter in the steps S3-0 to S3-3*, in order
to ensure adequate charging of the motor vehicle
battery (5), and at the same time to optimize the fuel
consumption and the emissions.

15 10. The method as claimed in claim 9,
characterized
in that
the at least one further parameter is the ambient
20 temperature (T).

11. The method as claimed in claim 10,
characterized
in that,
25 in step S4-3, a nominal value for the charging voltage
for the normal charge level is predetermined for an
unlimited time, irrespective of the temperature, for
the generator (4) irrespective of the assessed state of
charge for a temperature below a first temperature
30 threshold value (Ts1) (step S3-0) and for a "restricted
power" (BZ3) state of charge (step S3-1*),
in step S4-2, a nominal value of the charging voltage
for engine load reduction, followed by the nominal
value of the charging voltage for the normal charge
35 level are predetermined over a predetermined time
period for the generator (4) for a "powerful" (BZ2)
state of charge (step S3-2*) and a temperature above
the first temperature threshold value (Ts1) (step S3-
0),
40 in step S4-1 the nominal value of the charging voltage

for engine load reduction is predetermined for a predetermined time period, after which a nominal value of the charging voltage for a reduced vehicle power supply system level, followed by a nominal value of the charging voltage for the recuperation level are predetermined for a predetermined time period for the generator (4) for a "very powerful" (BZ1) state of charge (step S3-1*) and a temperature above the first temperature threshold value (Ts1) (step S3-0) and below a second temperature threshold value (Ts2) (step S3-1*), and in step S4-3, the nominal value of the charging voltage is predetermined for the normal charging level for an unlimited time for the generator (4) for a "very powerful" (BZ1) state of charge and a temperature above the second temperature threshold value (Ts2) (step S3-3*).

12. The method as claimed in claim 11, characterized in that the first temperature threshold value (Ts1) is 0°C, and the second temperature threshold value (Ts2) is 25°C.

13. An apparatus for battery state identification for a motor vehicle, having:
a device (8) for measurement of a voltage of a motor vehicle battery (5) during the starting process of a motor vehicle over a predetermined time period,
a device (7) for determination of a minimum level of the motor vehicle battery (5) during the predetermined time period of the measurement process,
a device (7) for assessment of a state of charge of the motor vehicle battery (5) on the basis of the determined minimum voltage level, and
a device (7) for controlling a generator (4) as a function of the assessment of the state of charge of the motor vehicle battery (5) in such a way that an adequate supply is ensured for the vehicle power supply system and adequate charging of the motor vehicle

battery (5) is ensured, with the fuel consumption and the emissions being optimized at the same time.

14. The apparatus as claimed in claim 13,

5 characterized

in that

a display device is provided, on which the state of charge is displayed to the vehicle user (as determined by the device (7), for assessment of the state of charge of the motor vehicle battery (5)) in different colors for each state of charge.

15. The apparatus as claimed in claim 13 or 14,

characterized

15 in that

the device (7) for controlling the generator (4)

- predetermines a nominal value of the charging voltage for a normal charging level for an unlimited time for the generator (4) when the state of charge is "restricted power" (BZ3),

- predetermines a nominal value of the charging voltage for engine load reduction, followed by the nominal value of the charging voltage for the normal charging level for a predetermined time period for the generator (4) for a "powerful" (BZ2) state of charge,

- predetermines the nominal value of the charging voltage for the value for engine load reduction, followed by a reduced vehicle power supply system level and then a recuperation level over a predetermined time period for the generator (4) for a "very powerful" (BZ1) state of charge.

16. The apparatus as claimed in claim 13 or 14,

characterized

35 in that

in addition, a device (9) is provided for measurement of the ambient temperature, whose measurement result is taken into account by the device (7) for controlling the generator (4), in addition to the result of the assessment of the state of charge.

17. The apparatus as claimed in claim 16,
characterized
in that

- 5 the device (7) for controlling the generator
- predetermines a nominal value of the charging voltage for the normal charging level for an unlimited time, irrespective of the temperature, for the generator irrespective of the assessed state of charge
 - 10 for a temperature below a first temperature threshold value (Ts1) and for a "restricted power" (BZ3) state of charge,
 - predetermines a nominal value of the charging voltage for engine load reduction, followed by the
 - 15 nominal value of the charging voltage for the normal charge level for a predetermined time period for the generator for a "powerful" (BZ2) state of charge and a temperature above the first temperature threshold value (Ts1),
 - 20 - predetermines the nominal value of the charging voltage for engine load reduction over a predetermined time period, then a nominal value of the charging voltage for a reduced vehicle power supply system level, followed by a nominal value of the charging
 - 25 voltage for the recuperation level for the generator for a "very powerful" state of charge (BZ1) and a temperature above the first temperature threshold value (Ts1) and below a second temperature threshold value (Ts2),
 - 30 - predetermines the nominal value of the charging voltage for the normal charging level for an unlimited time for the generator for a "very powerful" (BZ1) state of charge and a temperature above the second temperature threshold value (Ts2).